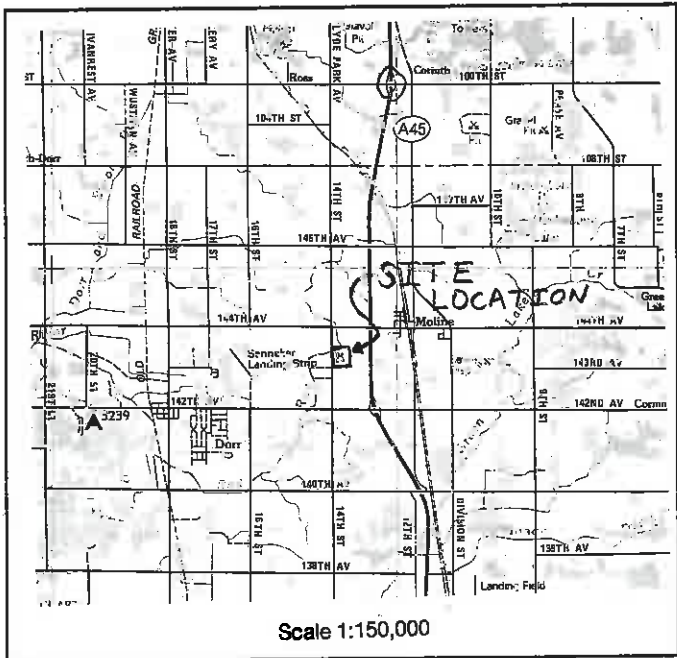


# Walnutdale Dairy Farm

## Storm Water Control & Storage Structures

ALLEGAN COUNTY, DORR TOWNSHIP  
SECTION 13, T4N – R12W



INDEX OF SHEETS	
SHEET NO.	TITLE
1	COVER SHEET
2	BENCHMARK / QUANTITIES / SPECIFICATIONS
3	NOTES
4	OVERALL PLAN VIEW
5	STORAGE STRUCTURE PLAN VIEW
6	SOLIDS TRAP PLAN VIEW
7	CONVEYANCE PLAN VIEW
8	TIE-IN PLAN VIEW
9	CROSS SECTION A-A'
10	CROSS SECTION B-B'
11	CROSS SECTION C-C'
12	CROSS SECTION D-D'
13	CROSS SECTION E-E'
14	CROSS SECTION F-F'
15	CROSS SECTION G-G'

TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, JUDGMENT AND BELIEF, THESE CONSTRUCTION DRAWINGS AND SPECIFICATIONS MEET ALL APPLICABLE STANDARDS AND SPECIFICATIONS.

**MARC GROENLEER, P.E.**  
No. 36752  
Date 8-30-04

TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, JUDGMENT, AND BELIEF, THESE PRACTICES ARE INSTALLED IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS AND SPECIFICATIONS.

Marc Groenleer, P.E. Date


INDEX OF SHEETS (CONTINUED)	
SHEET NO.	TITLE
16	CROSS SECTION H-H'
17	CROSS SECTION I-I'
18	CROSS SECTION J-J'
19	BOOT AND TRENCH DETAILS
20	BATTEN AND GAS VENT DETAILS
21	GEOWEB DETAILS
22	BUCKING WALL / RISER DETAILS
23	ALLEY CUT and FREEBOARD INDICATOR DETAILS
24	SOIL EROSION CONTROL PLAN
25	SILT FENCE / RIP RAP DETAILS
26	RIP RAP DETAILS
27	CHECK DAM DETAILS
28	TEMPORARY SEEDING DETAILS
29	PERMANENT SEEDING DETAILS
30	BLANKET MULCHING DETAILS

THESE CONSTRUCTION DESIGN PLANS AND SPECIFICATION HAVE BEEN REVIEWED AND ALL PARTIES UNDERSTAND THEIR RESPONSIBILITIES.

LANDOWNER/OPERATOR: \_\_\_\_\_

EXCAVATOR/CONTRACTOR: \_\_\_\_\_

CONSULTING ENGINEER: **Marc E. Groenleer, P.E.**



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PROJECT NO: 13-020064  
SCALE: AS SHOWN  
DRAWN BY: PCW  
CHECKED BY: MEG

Walnutdale Dairy Farm  
COVER SHEET

Storm Water Control & Storage Structures

DATE: AUG 2004  
SHEET: 1

# Walnutdale Dairy Farm

## Storm Water Control & Storage Structures

ALLEGAN COUNTY, DORR TOWNSHIP  
SECTION 13, T4N – R12W

### SPECIFICATIONS

SPEC NO	TITLE
MI-102	DIVERSIONS
MI-108	GRASSED WATERWAYS
MI-118	SURFACE DRAINAGE DITCH
MI-150	SITE PREPARATION
MI-152	EXCAVATION
MI-154	EARTHFILL
MI-159	PLAIN CONCRETE
MI-162	SALVAGING AND SPREADING TOPSOIL
MI-164	LOOSE ROCK RIP RAP
MI-165	GEOTEXTILES
MI-166	SEEDING / MULCHING
MI-167	MULCH NETTING
MI-182	PLASTIC (PVC, PE) PIPE
MI-184	FLEXIBLE MEMBRANE LINERS

### BENCHMARK DESCRIPTION

THE BENCH MARK IS A SPIKE ON A UTILITY POLE THAT IS LOCATED NEAR THE NORTHWEST CORNER OF PIT 6 AS SHOWN ON SHEET 4. ELEVATION IS 764.36 FEET.

### TABLE OF ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
EARTHFILL	C.Y.	13,000
CUT	C.Y.	4,500
J-DRAIN	L.F.	1,200
EDPM 45-MIL LINER	S.F.	131,000
GEOWEB (8.5 FT x 29 FT)	SECT	6
GEOTEXTILE (NONWOVEN)	S.F.	4,100
CONCRETE	C.Y.	125
PVC GAS VENTS	EA.	3
SILT FENCE	L.F.	1,600
PIPE 12-INCH PVC	L.F.	120 (1X90, 1X30)
RIP RAP D <sub>50</sub> – 6 INCH	C.Y.	24
MULCH AND SEED	ACRE	2.2
BLANKET MULCH AND SEED	S.Y.	6,500



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Walnutdale Dairy Farm  
BENCHMARK / QUANTITIES / SPECS

Storm Water Control & Storage  
Structures

DATE:  
AUG 2004

SHEET:

SHEET:

2

GENERAL NOTES

1. THE OWNER IS RESPONSIBLE FOR OBTAINING AND COMPLYING WILL ALL PERMITS AND EASEMENTS. THIS INCLUDES ALL FEDERAL, STATE, AND LOCAL PERMITS.
2. THE OWNER IS RESPONSIBLE FOR INVESTIGATING AND COMPLYING WITH ALL LOCAL ORDINANCES, WHICH MAY PERTAIN TO THIS PERMIT.
3. MISS DIG (1-800-482-7171) MUST BE CONTACTED AT LEAST 3 DAYS PRIOR TO CONSTRUCTION INITIATION IF;
  - a) THE CONSTRUCTION EQUIPMENT WILL NOT BE ABLE TO MAINTAIN AT LEAST 10 FEET OF CLEARANCE FROM ANY OVERHEAD UTILITY LINES, OR
  - b) THE CONSTRUCTION ACTIVITIES INVOLVE ANY EXCAVATION, DRILLING OR BORING OPERATIONS, AND/OR DISCHARGE OF EXPLOSIVES IN OR ADJACENT TO A STREET, HIGHWAY, OR OTHER PUBLIC PLACE, IN A PRIVATE EASEMENT FOR A PUBLIC UTILITY, OR NEAR THE LOCATION OF UTILITY FACILITIES.
4. FOR SITES WHERE MISS DIG MUST BE CONTACTED, THE OWNER IS RESPONSIBLE FOR THE CONTRACTOR CONTACTING MISS DIG. THE MISS DIG TICKET NUMBER MUST BE AVAILABLE UPON REQUEST.
5. THE OWNER IS RESPONSIBLE FOR LOCATING ANY BURIED UTILITIES (WATERLINES, ELECTRIC LINES, TELEPHONE LINES, GAS LINES, SEWER LINES, ETC.) NOT COVERED BY THE MISS DIG PROGRAM.
6. THE CONSULTING ENGINEER MAKES NO CLAIM AND ASSUMES NO RESPONSIBILITY REGARDING THE PRESENCE OR NONEXISTENCE OF UTILITIES.
7. FOR SITES WHERE MISS DIG MUST BE CONTACTED, IT IS THE OWNER'S RESPONSIBILITY TO INFORM THE CONTRACTOR/EXCAVATOR OF THEIR RESPONSIBILITIES BY PROVIDING A COPY OF THE COVER SHEET. THE COVER SHEET MUST BE SIGNED BY THE CONTRACTOR AND BY DOING SO THEY ACKNOWLEDGE THAT THEY UNDERSTAND THEIR RESPONSIBILITIES. A COPY OF THE SIGNED COVERSHEET SHALL BE KEPT ON SITE DURING CONSTRUCTION AND COPIES SHALL BE DISTRIBUTED TO ASSOCIATED PARTIES.
8. THE CONTRACTOR IS RESPONSIBLE FOR KNOWING AND ACKNOWLEDGING THE APPROPRIATE SAFETY STANDARDS REQUIRED BY THE MICHIGAN OCCUPATIONAL SAFETY AND HEALTH ACT (MIOSHA).
9. ALL NECESSARY SAFETY EQUIPMENT MUST BE WORN BY THOSE EXPOSED TO WORK PLACE HAZARDS.
10. THE OWNER SHALL NOTIFY THE ENGINEER AT LEAST ONE-WEEK PRIOR TO INITIATION OF CONSTRUCTION. CALL 616-575-1012.
11. ANY DEVIATION FROM THESE PLANS AND SPECIFICATIONS WITHOUT THE APPROVAL OF THE CONSULTING ENGINEER COULD RESULT IN NONCOMPLIANCE WITH GUIDELINES AND/OR STORAGE STRUCTURE FAILURE.

DESIGN NOTES

1. THE WASTE WATER STORAGE STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE USDA-NRCS-MICH TECHNICAL GUIDE SECTION IV "STATE-WIDE WASTE STORAGE FACILITY 313."
2. THE FREEBOARD OF 2 FEET BELOW THE ELEVATION OF 759.5 FEET, ALLOWS FOR THE CONTAINMENT OF RUNOFF GENERATED FROM A 25-YEAR, 24 HOUR STORM PLUS THE NRCS SPECIFIED STANDARD OF 1 FOOT.
3. THIS STORAGE STRUCTURE HAS THE CAPACITY TO STORE 449,000 C.F. (3.36 MILLION GALLONS) INCLUDING 2 FEET OF FREEBOARD.
4. ALL RUNOFF FLOW INTO THE STORAGE STRUCTURE IS GRAVITY.
5. THE STRUCTURE HAS BEEN DESIGNED ASSUMING THAT THE FINAL FINISH GRADE OF THE BOTTOM WILL SLOPE TO THE NORTHWEST CORNER OF THE STORAGE STRUCTURE.
6. WARNING SIGNS, LADDERS, ROPES, BARS, RAILS, FENCES, AND/OR DEVICES SHALL BE PROVIDED, AS APPROPRIATE, IN AN ATTEMPT TO PRESERVE THE SAFETY OF HUMANS AND LIVESTOCK.
7. THE CONVEYANCE CHANNEL IS ON A 0.5% SLOPE. THE CHANNEL SHAPE IS TRIANGULAR. THE CHANNEL WALLS ARE TWO FEET IN HEIGHT OR GREATER WITH A 4:1 (HORIZONTAL TO VERTICAL) SIDE SLOPE OR SHALLOWER
8. FOR THE PURPOSES OF THIS WORK IT HAS BEEN ASSUMED THAT SOLID ACCUMULATION BEYOND THE SOLIDS TRAP WILL BE MINIMAL AND WILL NOT SIGNIFICANTLY REDUCE THE VOLUME.
9. THE ENGINEER RECOMMENDS THAT THE ABOVE ASSUMPTIONS BE RECOGNIZED SO THAT DESIGN INTENT REMAINS VALID DURING CONSTRUCTION.

SPECIFICATION NOTES

1. THE OWNER SHALL ARRANGE A MEETING WITH THE CONTRACTOR AND THE ENGINEER TO REVIEW THE PLANS, STANDARDS, SPECIFICATIONS, AND TESTING REQUIREMENTS PRIOR TO CONSTRUCTION. OTHERWISE, THE ENGINEER CANNOT AND WILL NOT ACCEPT RESPONSIBILITY FOR DESIGN MISINTERPRETATIONS.
2. COMPACTED EARTH BERMS SHALL HAVE A SIDE SLOPE OF 3:1 OR FLATTER.
3. TO THE EXTENT TO WHICH THEY ARE NEEDED, ALL SUITABLE EXCAVATED MATERIALS WILL BE USED AS BERM MATERIAL. ALL EXCESS EXCAVATED MATERIAL WILL BE PLACED ON THE EXTERIOR SLOPES OF THE BERMS.
4. THE MATERIAL PLACED AS FILL SHALL BE FREE OF ALL SOD, ROOTS, FROZEN SOIL, AND/OR OTHER OBJECTIONABLE MATERIALS.
5. SOIL PLACED FOR THE BERMS SHALL BE PLACED WITH A COMPACTION OF 90% OF THE MAXIMUM DENSITY AS DETERMINED BY THE STANDARD PROCTOR TEST (ASTM D-698) OR COMPACTION SHALL FOLLOW THE METHODS DESCRIBED IN CONSTRUCTION SPECIFICATION MI-154, EARTHFILL. THE FILL PLACED FOR BERMS SHALL BE OBSERVED AND IN PLACE COMPACTION TESTED AT LEAST ONE DURING AND ONCE FOLLOWING CONSTRUCTION BY A QUALIFIED CIVIL ENGINEERING TECHNICIAN.
6. EXCAVATED FINAL GRADES AND INTERIOR SLOPES OF BERMS SHALL BE SMOOTH ROLLED PRIOR TO PLACEMENT OF THE EDPM LINER TO THE SATISFACTION OF THE LINER INSTALLER.
7. SPECIFICATION FOR THE LINER INSTALLATION SHALL BE PER MANUFACTURE'S RECOMMENDATIONS.
8. THE LINER OF THE SOLIDS TRAP SHALL BE UNDERLAIN BY J-DRAIN WITH APPROXIMATE SPACING OF 25 FEET ON CENTER OR AN ENGINEER APPROVED EQUIVALENT.
9. DURING AND/OR IMMEDIATELY FOLLOWING CONSTRUCTION ALL EMBANKMENTS AND DISTURBED AREAS SURROUNDING THE FACILITY SHALL BE TREATED TO CONTROL EROSION IN ACCORDANCE WITH THE STORMWATER CONTROL STRUCTURES SOIL EROSION CONTROL PLAN. THE MULCHING TYPE AND RATE AND SEEDING TYPE, RATE, AND METHOD ARE LEFT TO THE DISCRETION OF THE OWNER. SEE MI-166 FOR FURTHER DETAILS.
10. THE GEOWEB SHALL BE UNDERLAIN BY AN 8 OUNCE AMOCO 4553 NONWOVEN GEOTEXTILE.
11. ALL DISTURBED AREAS NOT ACTIVELY BEING WORKED FOR MORE THAN FIVE CONSECUTIVE DAYS MUST HAVE TEMPORARY GROUND COVER APPLIED.
12. PERMANENT EROSION CONTROL MUST BE APPLIED WITHIN FIVE DAYS OF FINAL GRADE.



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MEG

Walnutdale Dairy Farm  
NOTES

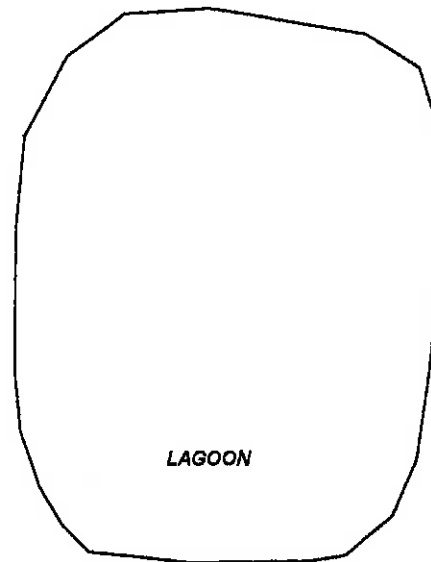
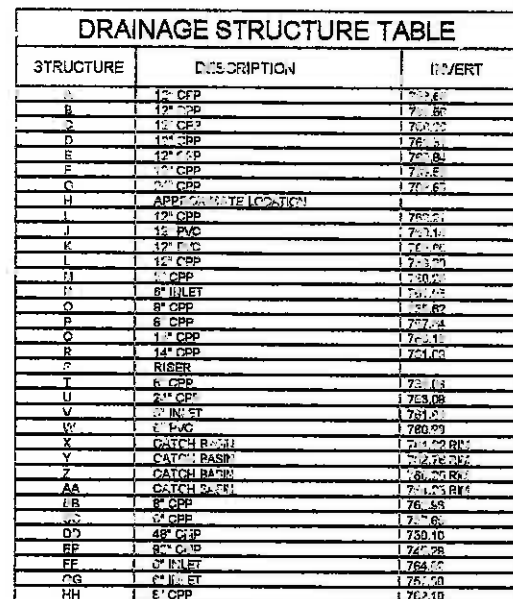
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Structures














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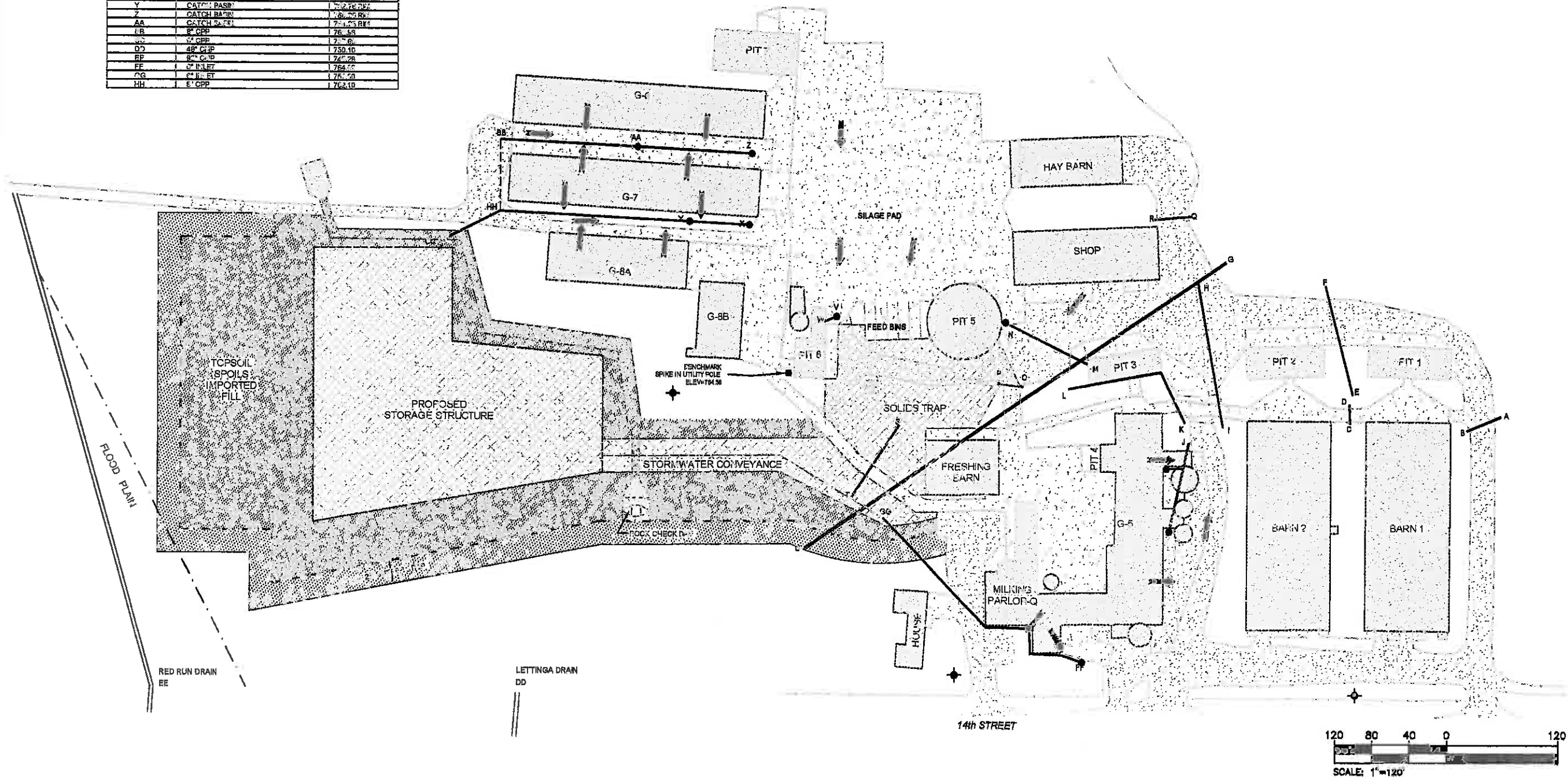
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3



- |   |                  |   |                                |   |                            |
|---|------------------|---|--------------------------------|---|----------------------------|
|  | BUILDINGS        |  | MULCHING AND PERMANENT SEEDING |  | UNDERGROUND CONDUIT        |
|  | GRAVEL           |  | BLANKET MULCH                  |  | SILT (FILTER) FENCE        |
|  | CONCRETE         |  | TEMPORARY SEEDING              |  | WELL                       |
|  | RIPRAP           |  | PROPOSED STRUCTURES            |  | STORM WATER FLOW DIRECTION |
|  | 25' BUFFER STRIP |   |                                |   |                            |



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WITH PROJECT No.: <b>13-020064</b>	CAD FILE NAME: <b>020064004</b>
DESIGNED BY: <b>P.C.W.</b>	PLOT DATE: <b>8-17-04</b>
DRAWN BY: <b>J.M.R.</b>	DRAWING SCALE: <b>AS SHOWN</b>
CHECKED BY:	INCEPTION DATE: <b>8-9-04</b>

WALNUTDALE DAIRY FARM  
OVERALL PLAN VIEW

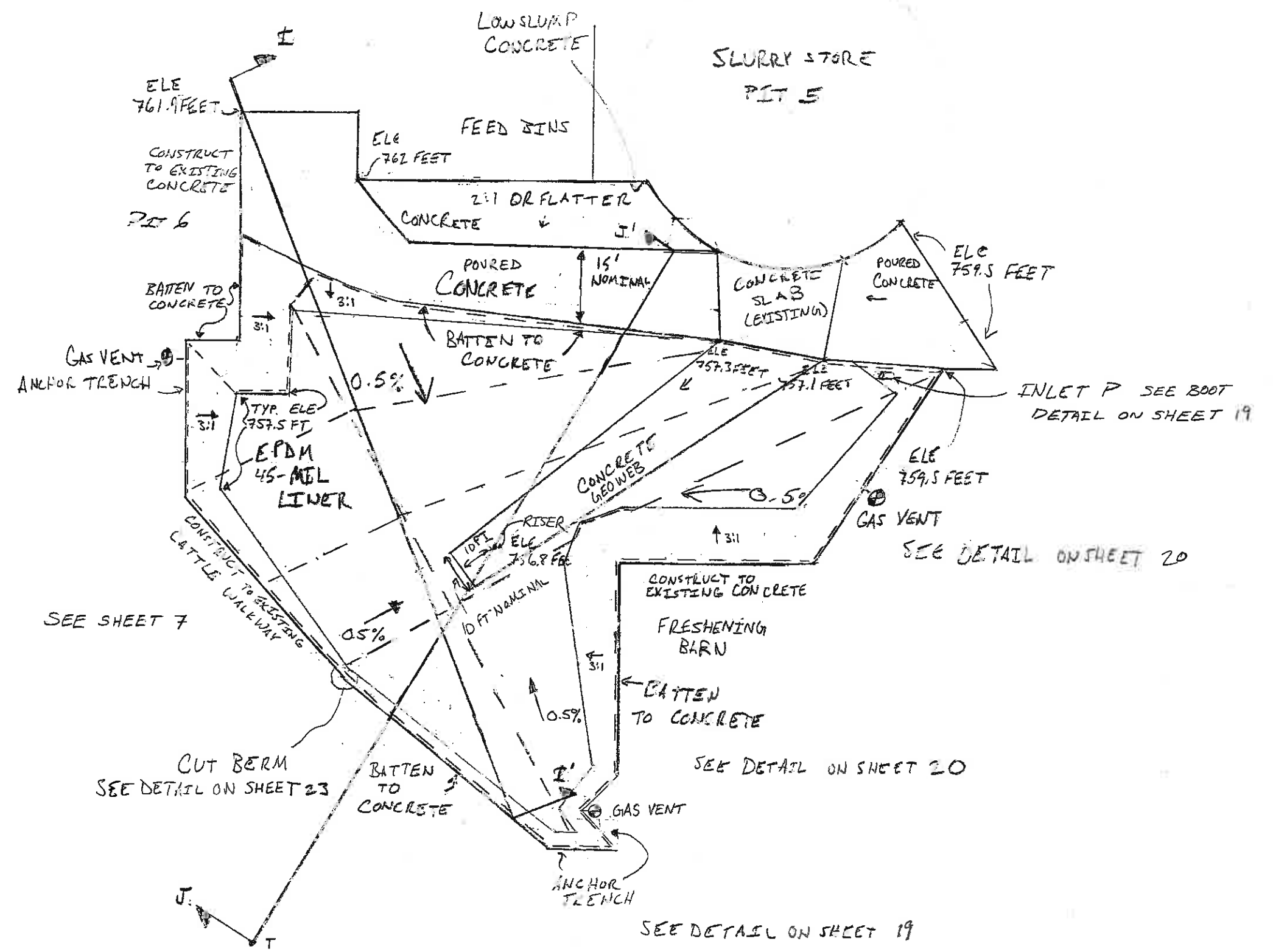
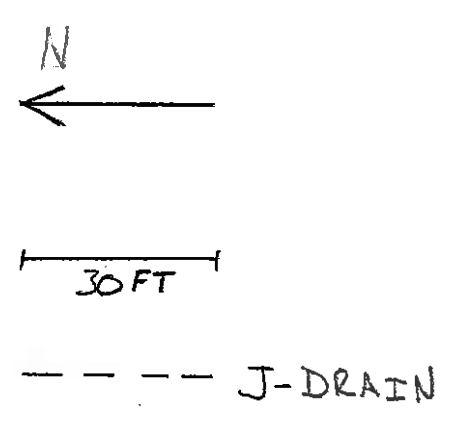
WAYLAND TOWNSHIP  
ALLEGAN COUNTY, MICHIGAN

FIGURE

4







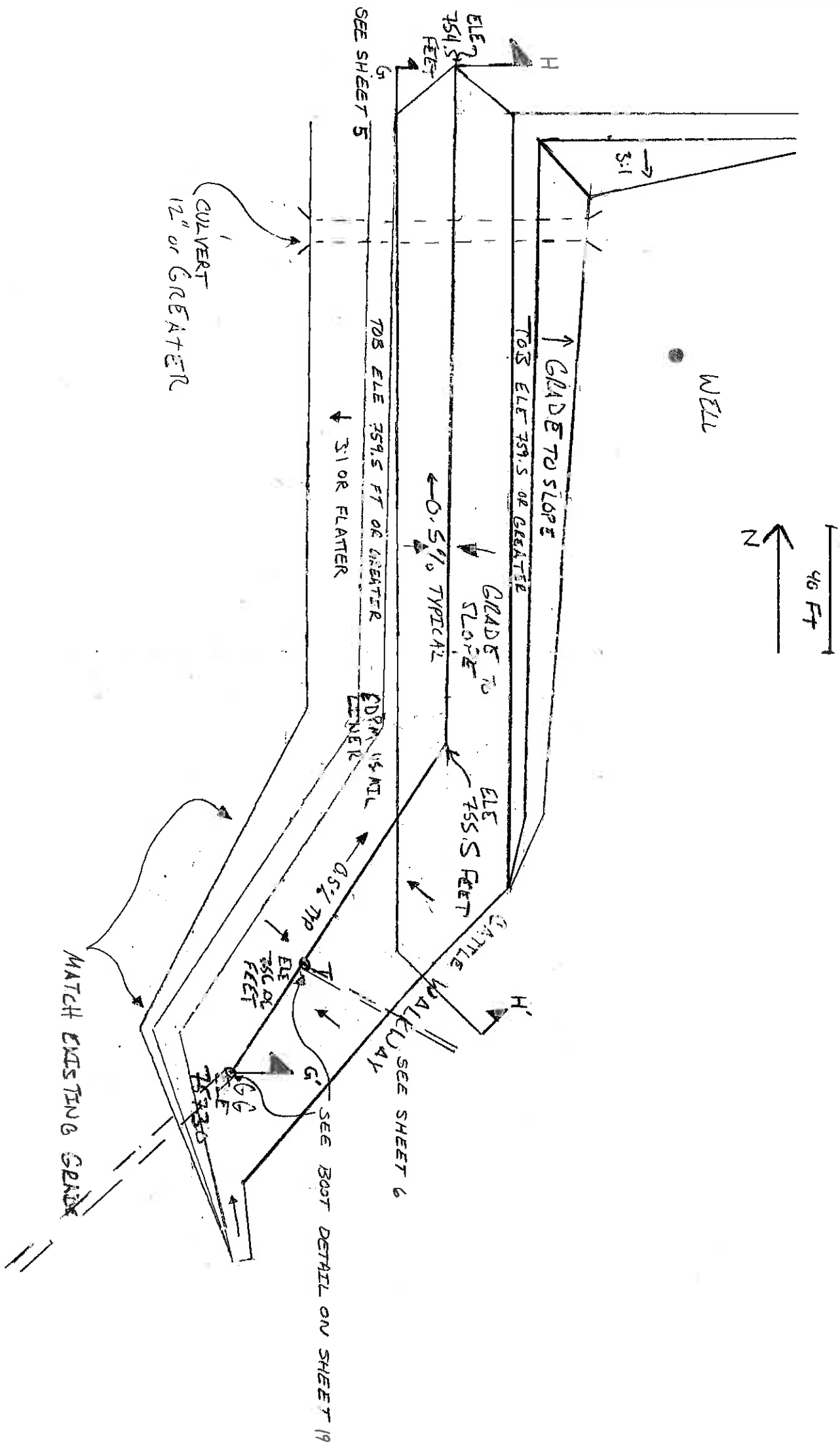
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PROJECT NO: 13-020064	SCALE: AS SHOWN	DRAWN BY: PCW	CHECKED BY: MEG
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Walnutdale Dairy Farm <b>SOLIDS TRAP PLAN VIEW</b>	Storm Water Control & Storage Structures
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**AUG 2004**

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**6**



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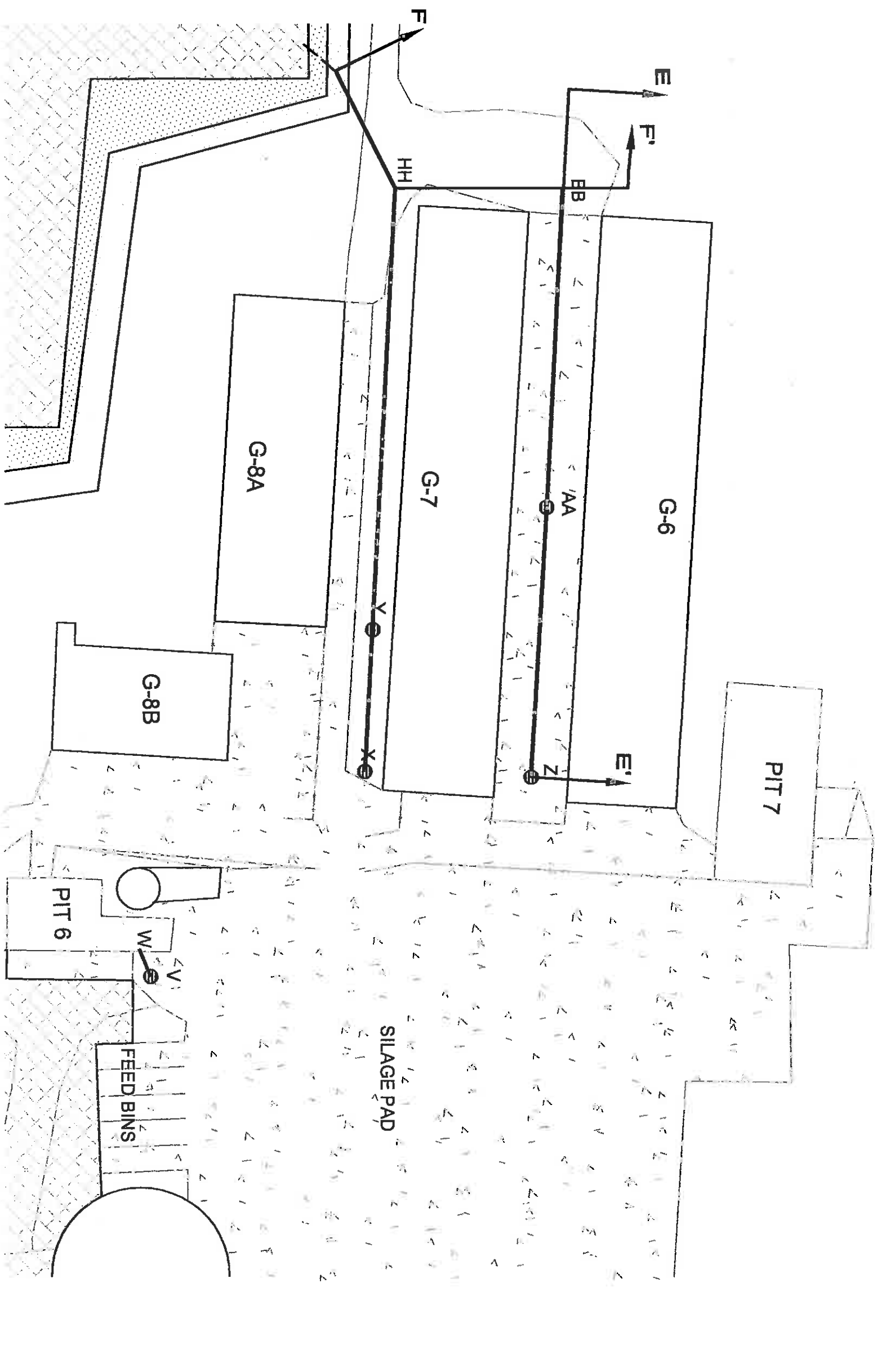
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13-020064  
SCALE:  
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Walnutdale Dairy Farm  
CONVEYANCE PLAN VIEW  
Storm Water Control & Storage  
Structures

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7



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NTH PROJECT No.: 13-020064	GAD FILE NAME: 020064006
DESIGNED BY: P.C.W.	PLOT DATE: 9-14-04
DRAWN BY: J.M.R.	DRAWING SCALE: AS SHOWN
CHECKED BY:	INCEPTION DATE: 8-16-04

**WALNUTDALE DAIRY FARM  
TIE-IN PLAN VIEW**

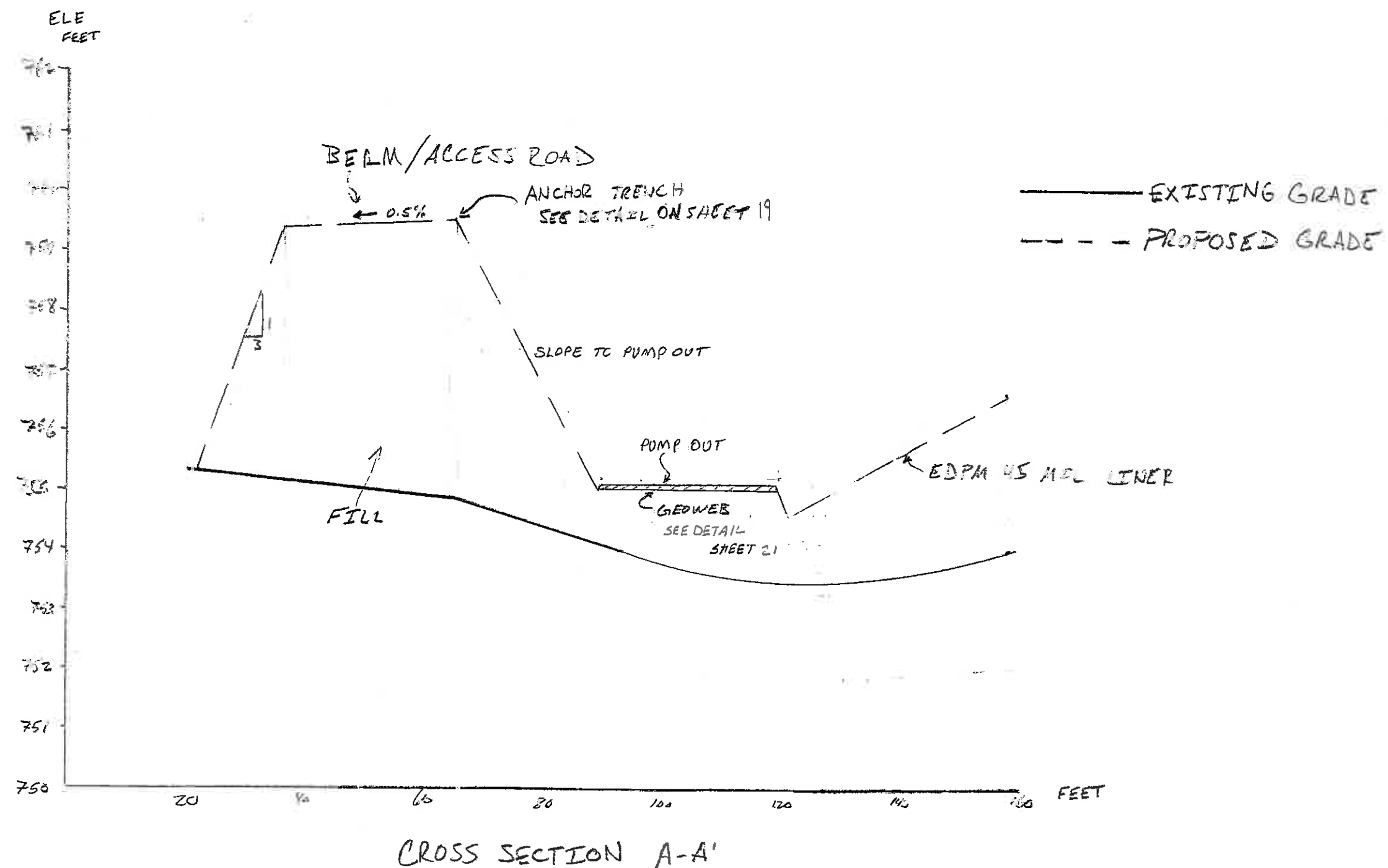
**WAYLAND TOWNSHIP  
ALLEGAN COUNTY, MICHIGAN**

FIGURE

8







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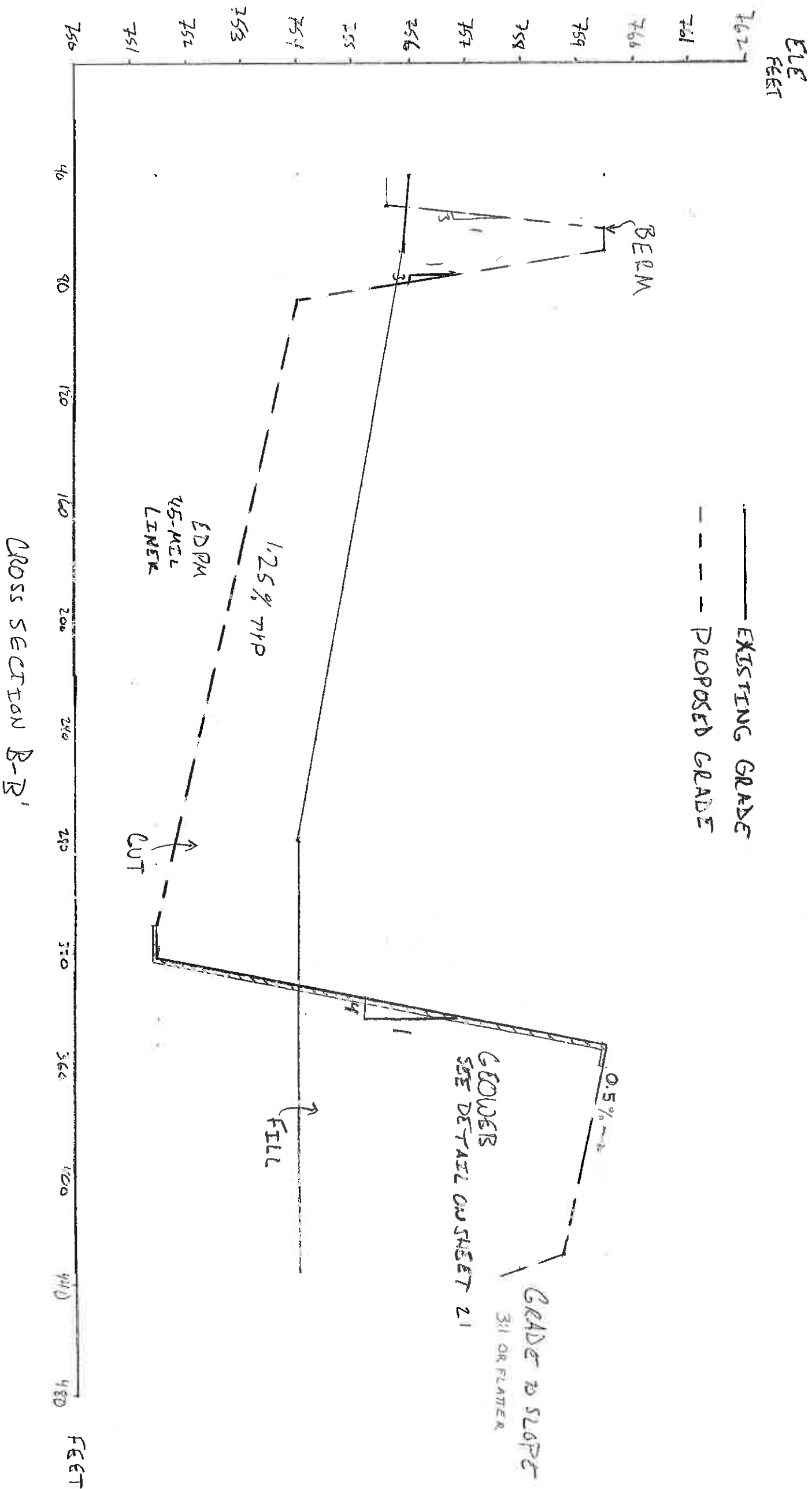
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Walnutdale Dairy Farm  
**CROSS SECTION A-A'**  
Storm Water Control & Storage  
Structures

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Walnutdale Dairy Farm  
CROSS SECTION B-B'

Storm Water Control & Storage  
Structures

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10